

Traffic Calming





Traffic Calming

A. Purpose

This section is intended to provide design options for traffic calming on new streets and streets being considered for retrofit. Some general design specifications are provided to assist designers in developing comprehensive streetscape plans for proposed development and redevelopment projects. It is emphasized that these are just guidelines and that innovative street designs that incorporate traffic calming are encouraged.

B. Overview

Traffic calming involves the use of various geometric features designed to reduce vehicle speeds or discourage shortcutting traffic. To achieve the desired effect of traffic calming, the effectiveness of such measures and their impacts should be evaluated on an area-wide basis.

Landscaping, street trees, street lighting, and street furniture are other methods of traffic calming that also create distinctive and pleasing streetscapes that encourage sidewalk activity. These improvements may involve consideration of irrigation and long-term maintenance to be provided by maintenance assessment districts or other agreements with the City.

Traffic calming is appropriate along circulation element roads as well as commercial and residential local streets. Local streets should be designed to function efficiently and safely, yet minimize the need for extensive traffic regulation, control devices, and enforcement. The function of the local street should be readily apparent to the user through its appearance and design.

C. General Guidelines

The following general guidelines should be considered in traffic calming installations:

- Delays to emergency vehicles should be minimized by the appropriate placement and design of traffic calming devices. In some cases, certain traffic calming devices may not be appropriate.
- Traffic calming installations should not divert traffic to other local residential streets. Traffic calming installations should support the street classifications established in community plans. Traffic may be diverted from residential streets to classified through streets. The potential impacts of traffic diversion should be evaluated for all traffic calming installations.
- Traffic calming devices on designated transit routes should be limited to those that permit the efficient movement of transit vehicles.
- Traffic calming installations must meet State and Federal accessibility requirements.
- Traffic calming should not impair the mobility of non-motorized users to of the street.
- Traffic calming installations must address drainage, sight distance, and location of underground utilities.
- All traffic calming installations are required to have a landscape element that includes trees and shrubs consistent with the Landscape Technical Manual. If traffic calming devices include decorative pavement, it shall comply with section E of the Design Standards in this Manual.

D. Traffic Calming Techniques

Traffic calming strategies generally fall into six categories:

- Horizontal deflections (chicanes, mini traffic circles, median slow points or chokers)
- Vertical deflections (road humps, speed tables, and raised crosswalks)
- Intersection pop-outs
- Traffic diverters (semi-diverters)
- Channelization

Enhancing the streetscape environment should have the same level of priority in the design scheme as traffic calming impacts. A general discussion of these categories follows along with more specific details and design guidelines for various traffic calming techniques.

Traffic calming" features such as median slow points or chokers, chicanes, mini traffic circles, and intersection 'pop-outs' may be provided in accordance with this design manual. Road humps or speed tables may be installed by the City on existing streets under some circumstances but should not be included in street construction or improvement projects.

E. Horizontal Deflections

Horizontal deflections are used to achieve speed reductions by breaking up the linear path of vehicle travel. Traffic calming designs that involve horizontal shifts in the travel way are inappropriate for major streets and arterials. Horizontal deflections include chicanes (mid-block) mini circles (intersections), and median slow points (mid-block and intersections).

Chicanes - A chicane is a channelization that causes a series of tight turns in opposite directions in an otherwise straight stretch or road. The combination of narrowed street width and the serpentine path of travel slows traffic. On new streets, chicanes narrow the street by widening the sidewalk or landscaped parkway. On streets considered for retrofit, raised islands are installed to narrow the street. The advantages of chicanes include: slow traffic, may create opportunity for landscaping, and tends not to divert traffic to nearby streets. Chicanes are inappropriate for use on streets classified as collector or higher, bus routes, emergency response routes, where there is a grade that exceeds 5 percent, or where there is limited stopping sight distance such as at the crest of a hill. Chicanes may cause some loss of on-street parking, may impact driveways, may increase emergency response time, or may affect drainage and street sweeping.

Mini Circles - A mini circle is a raised circular island placed in the center of an intersection. Traffic yields on entry, then enters to the right, traveling around the circle counter clockwise. A mini circle slows traffic on each approach, reduces right-of-way conflicts, creates a landscaping opportunity, and tends not to divert traffic to nearby streets. Mini circles are

appropriate for usage on low volume local residential streets with alternative access points. Mini circles should not be used on streets classified as collector or high, bus routes or emergency response route, where the grade exceeds 5 percent on any approach, or where there is limited stopping sight distance. A mini circle may impact large vehicles' turns or may increase emergency response time.

Median Slow Points - A median slow point is a small median or island placed in the center of a roadway that causes traffic to shift its path to the right in order to travel around it. It may be on an approach to an intersection or mid-block. If median slow points are installed at an intersection, the street should have alternative access points. A median slow point slows traffic, creates a pedestrian refuge area, creates a landscaping opportunity, and tends not to divert traffic to nearby streets. Median slow points may be used on two lane streets. It should not be used on streets classified as major or higher or where there is limited stopping sight distance. Median slow points may cause some loss of on-street parking or may impact large vehicles' turns when installed at intersections.

F. Vertical Deflections

Vertical deflections are an effective traffic calming technique for speed reductions and discouraging shortcutting on local streets. Vertical shifts are only appropriate on two-lane streets. Traffic calming designs that involve vertical shifts are inappropriate for collector streets, major streets and arterials. Vertical deflections include road humps and speed tables/raised crosswalks.

Road Humps - Road humps are rounded raised areas placed across the road. Road humps are approximately 12 feet long (in the direction of travel), 3.5 inches high, and parabolic in shape. It is usually constructed with a taper on each side within a foot or two of the gutter line to allow unimpeded drainage between the hump and curb. They are most effective when used in groups that are spaced close enough to avoid encouraging speeding between humps. Road humps are different from speed bumps. Speed bumps are much more abrupt, usually less than three feet in length, and are used in parking lots and private drives. Speed bumps are not used on public streets.

While primarily used for speed reductions, road humps can also result in the reduction of traffic volumes on streets where they are employed by diverting traffic to other nearby streets. Road humps should not be used on streets classified as collector or higher, emergency response routes, bus routes, where grade exceeds 5 percent, or where there is limited stopping sight distance. The disadvantages of road humps may include diverting traffic to other low-volume local streets, increasing emergency response time, or increasing noise.

Speed Tables/Raised Crosswalks - Speed tables, essentially, are flat-topped road humps, often constructed with brick or other textured materials on the flat section. Speed tables are 3-1/2 inches high and 22 feet long in the direction of travel, with 6-foot ramps at the ends and a 10-foot field on top. The brick or other textured materials improve the appearance of speed tables and draw attention to them. Speed tables are less jarring than the standard 12 road humps. Speed tables are most effective when installed in groups of two or more, about 300 feet apart. Where extended from curb-to-curb and appropriately marked, speed tables serve as raised crosswalks. Raised crosswalks bring the street up to sidewalk level. Drainage requirements must be evaluated and addressed where raised crosswalks are installed.

Speed tables and raised crosswalks reduce vehicle speeds. Raised crosswalks enhance pedestrian safety. The disadvantages of speed tables/ raised crosswalks may include diverting traffic to nearby low-volume local streets, increasing noise and increasing emergency response times. Speed tables/raised crosswalks should not be installed on streets classified as collector or higher, emergency response routes, bus routes, where grade exceeds 5 percent, or where there is limited stopping sight distance.

G. Intersection Pop-outs.

Intersection pop-outs are curb extensions that narrow the street at intersections by widening the sidewalks at the point of crossing. They are used to make pedestrian crossings shorter and reduce the visual width of long, straight streets. Where intersection pop-outs are constructed by widening the landscaped planting strip, they can have a positive effect on the visual appearance of the neighborhood. Pop-outs can be used at intersections to create a street gateway effect, visually announcing an entrance to a neighborhood. Intersection pop-outs must accommodate bicyclists, transit vehicles and emergency response vehicles. Pop-outs improve pedestrian visibility, create shorter pedestrian crossing width, and may reduce vehicle speeds. Pop-outs may impact large vehicle turns, may impact accessibility by transit vehicles or emergency response vehicles, and may require parking removal. Intersection pop-outs may be installed on local streets, collector streets, and urban major streets. Pop-outs are inappropriate on major streets and primary arterials. The entire intersection should be designed and constructed at one time.

H. Traffic Diverters

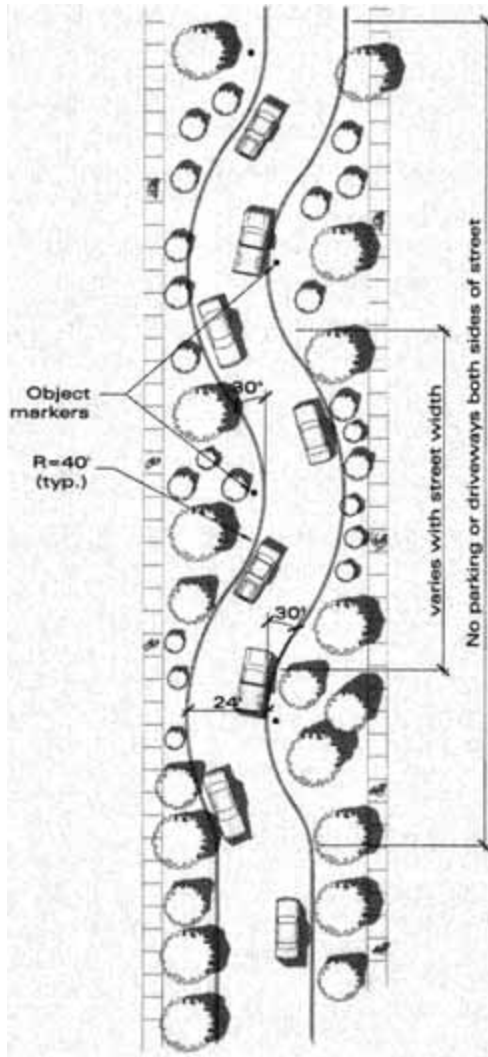
Traffic diversion devices eliminate through trips on streets on which they are installed and divert those trips to other streets. There are several available traffic diversion designs that may be used to calm traffic. Traffic diverters are not primarily installed for the purpose of speed control. Diverters are best suited on long, straight, low-volume, local residential streets. Wherever traffic diversion techniques are employed, provision should be made for continuation of pedestrian and bicycle routing around or through the diversion. Care must be taken in design of diversion installations to allow for emergency vehicles.

Semi diverters. - A semi diverter is a barrier to traffic in one direction of a street that permits traffic in the opposite direction to pass through. It is an alternative to one-way street operation for a block and it allows residents on the block limited two-way travel opportunity. A semi diverter may be used on low-volume, local residential streets and it is best located at the end of a block to prevent entrance and allow exit. Semi diverters reduce cut-through motorized vehicle traffic, reduce pedestrian crossing widths, and create opportunity for landscaping. Semi diverters may divert traffic to other low-volume streets, may increase trip lengths, may cause loss of parking, and may increase emergency response time. Semi diverters are inappropriate for use on emergency response routes, bus routes, or streets classified as collector or higher. No specific geometric features are included in this manual since semi diverters are site specific and should be designed on a case-by-case basis.

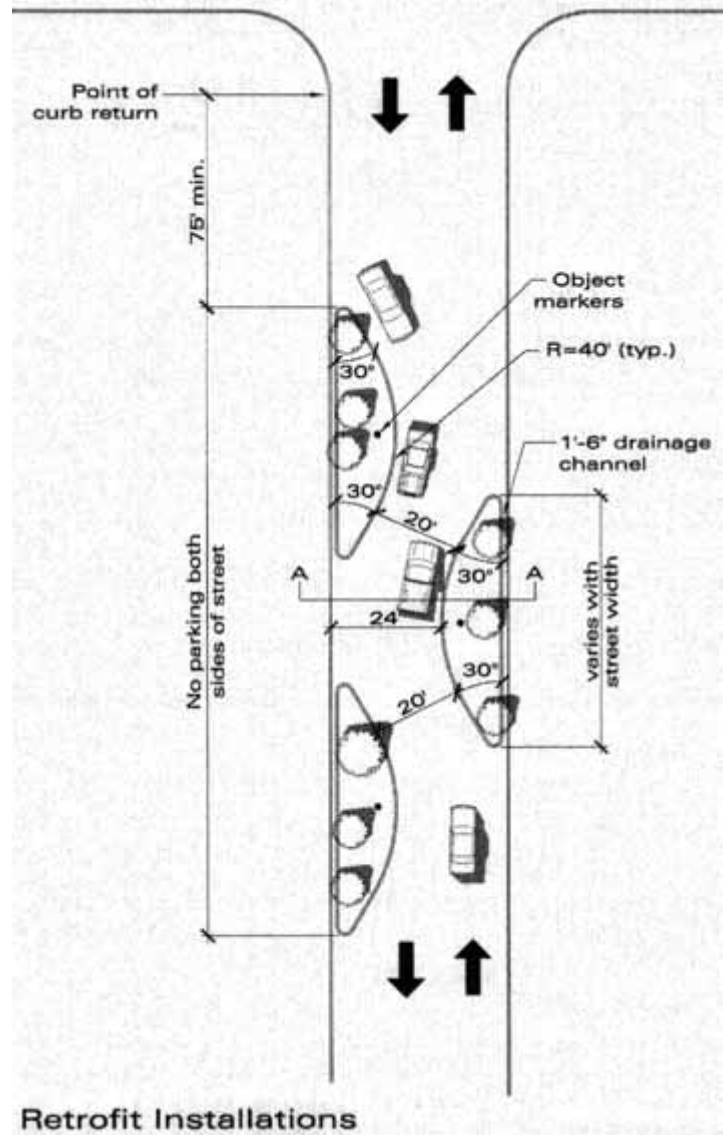
I. Channelization

Channelization may be used on arterial streets to prevent cut-through traffic onto local streets or to control turning traffic in or out of a neighborhood. Channelization can be achieved through regulatory signs and pavement markings, landscaping, or raised channelization islands aimed at motorized, non-motorized, or pedestrian traffic. Channelization may be designed to prevent cut-through traffic, reduce speed, create opportunity for landscaping, control turning traffic in and out of a neighborhood, or physically guide pedestrians. The disadvantages of channelization may include creating out-of-direction travel, increasing trip lengths, increasing emergency response time, or impacting accessibility. No specific geometric features are included in this manual since channelization devices are site specific and should be designed on a case-by-case basis.

Tc Traffic Calming -Chicane



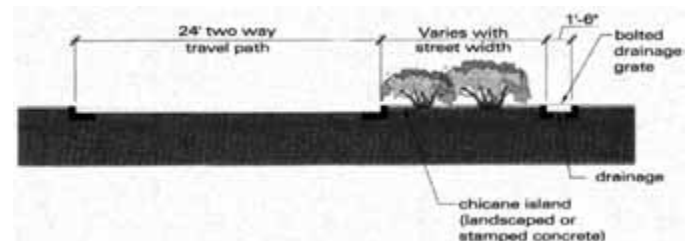
New Installations

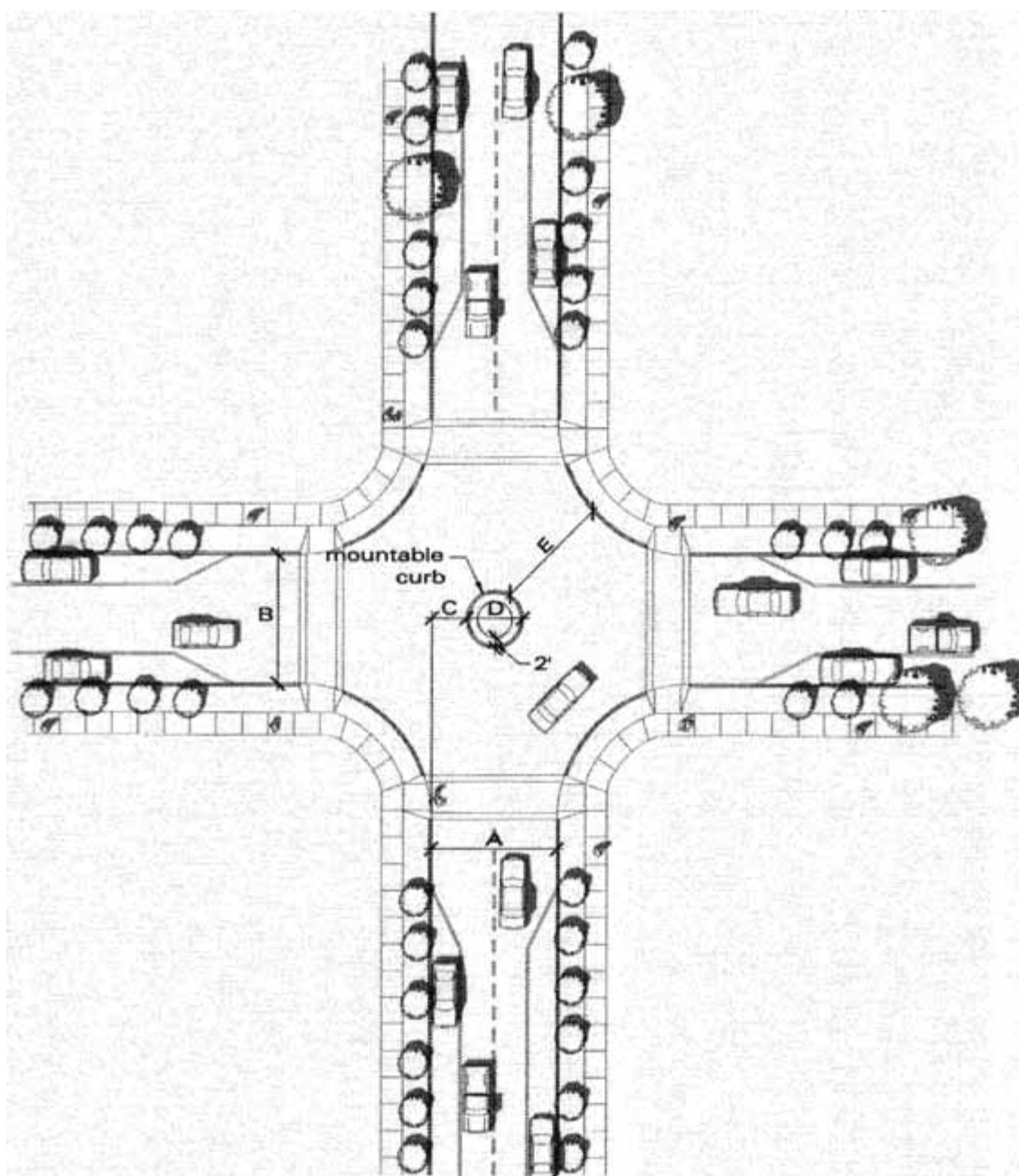


Retrofit Installations

NOTES:

- * Spacing of chicane segments depend on site considerations, e.g. driveway locations.
- * Island plantings should not obscure driver's view of chicane traffic (24" maximum height).
- * Stamped concrete may be used in the chicane island.
- * Bicycles are to use the same path as motor vehicles, not the drainage channel.

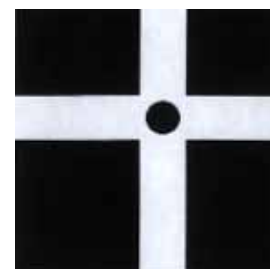




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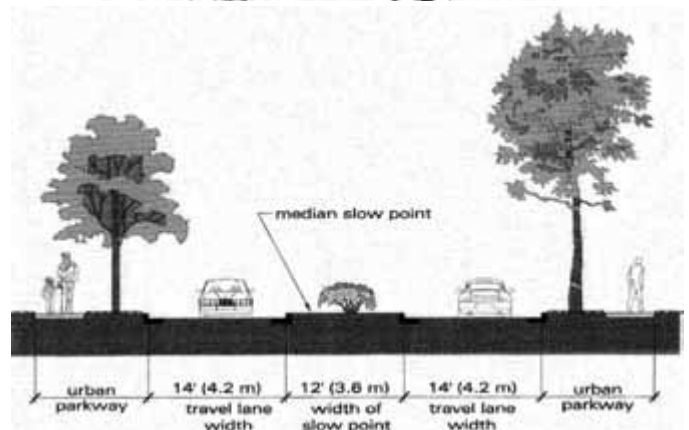
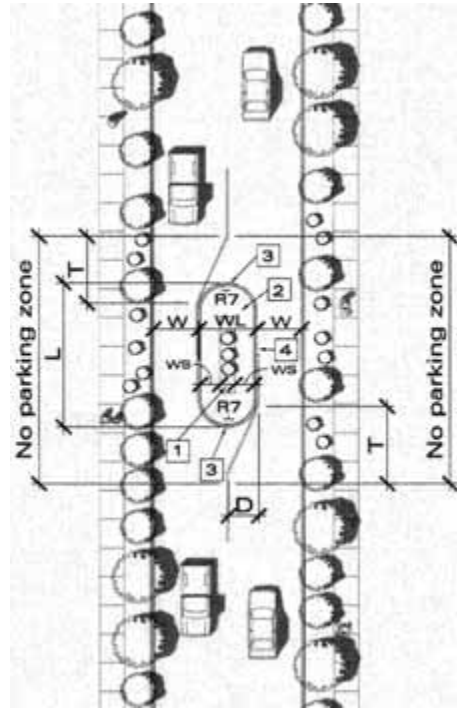
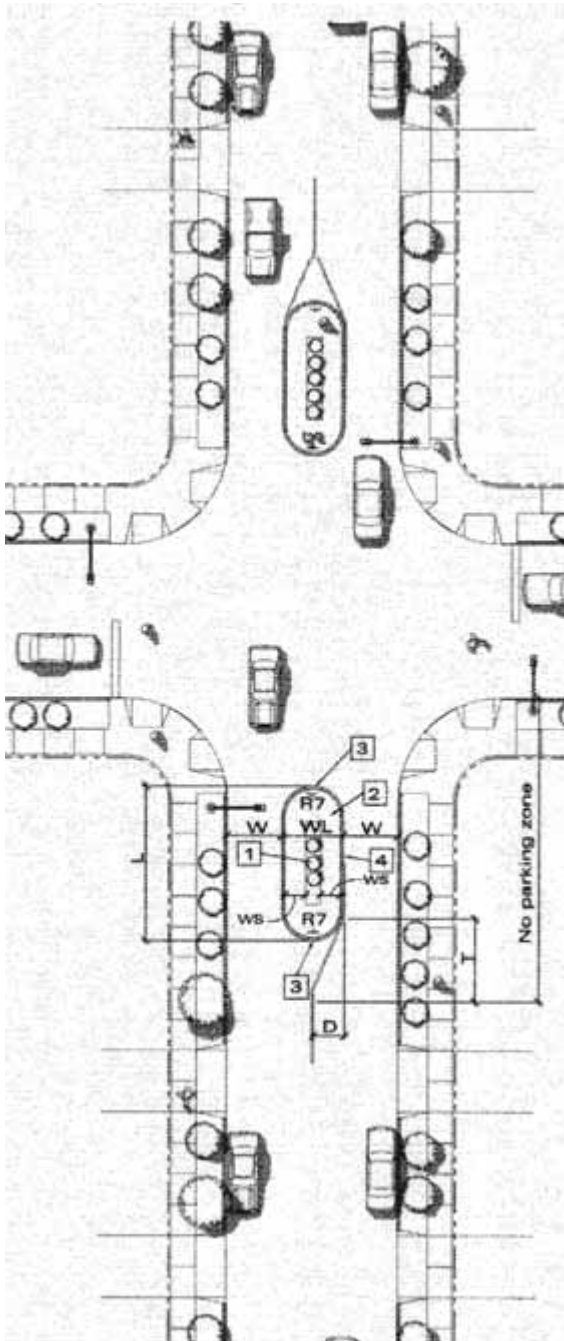
- A - street width - 32 feet min.
- B - cross street width (varies) 32 feet min.
- C - travel width (10')
- D - circle diameter (12' minimum)
- E - opening width (18' minimum)
- * where $A \leq B$

Note: To provide for emergency vehicles, traversable low profile landscaping should be used.





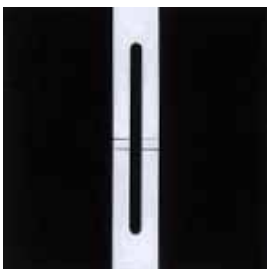
Traffic Calming -Median Slow Point

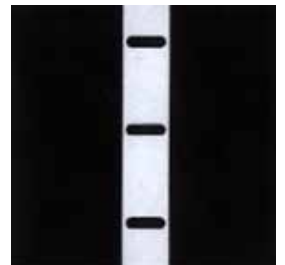
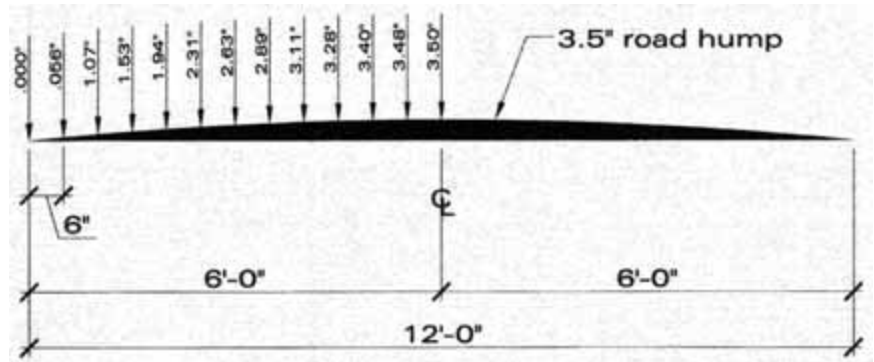
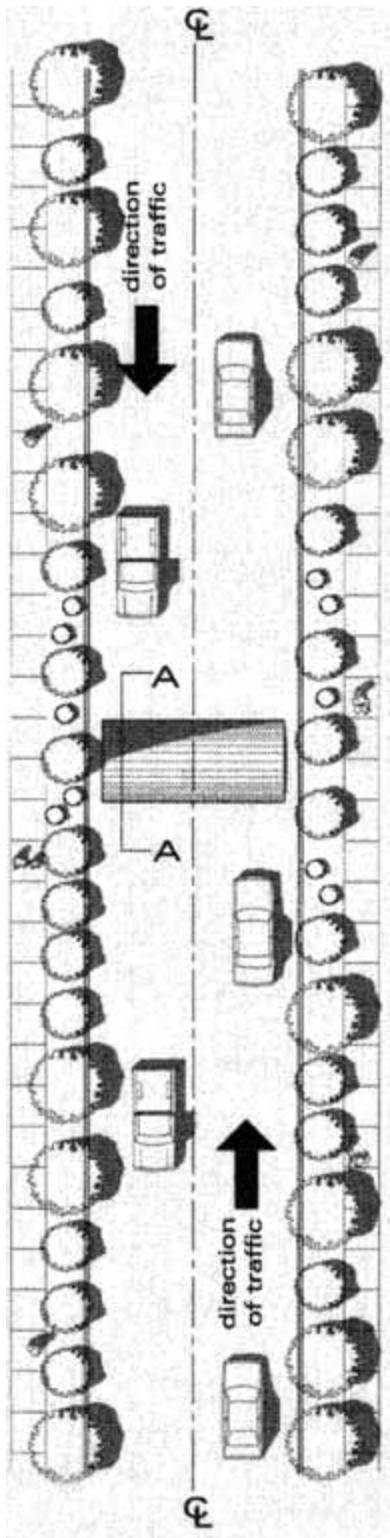


Legend

- 1 area that may be landscaped (landscape, irrigation, and long term maintenance must be considered by a maintenance assessment district or other agreements with the City of San Diego.)
- 2 stamped concrete
- 3 yellow painted island nose
- 4 6" curb

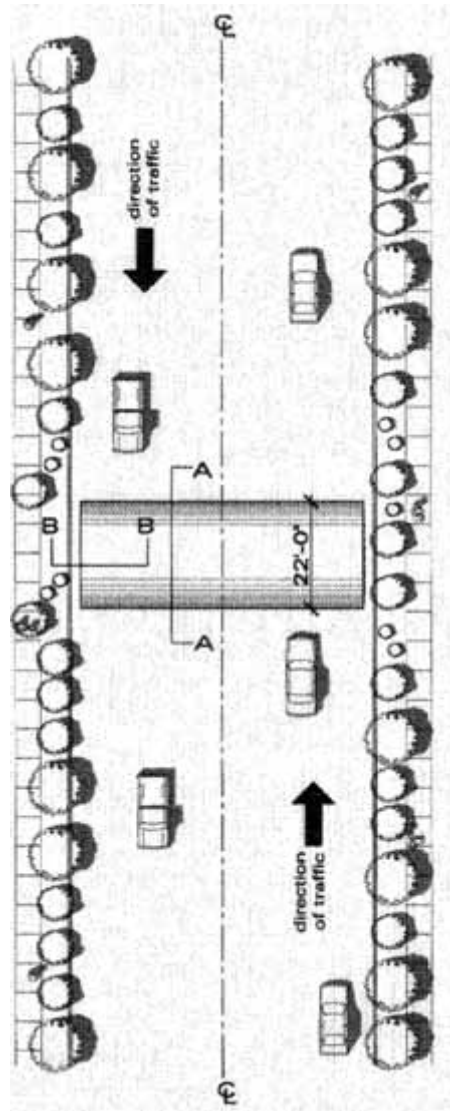
W - travel lane width - 14'
 WL - Width of slow point
 (varies depending on street width-
 12' minimum)
 W - For landscaped slow point, 2' typical
 L - Length of slow point, varies
 depending on parking and driveways
 D - horizontal deflection, 6' minimum
 T - Transition, calculated as follows:
 $T = (D \times S^2) / 120$ - minimum
 Where: D = deflection in feet
 S = 85th percentile speed
 in mph





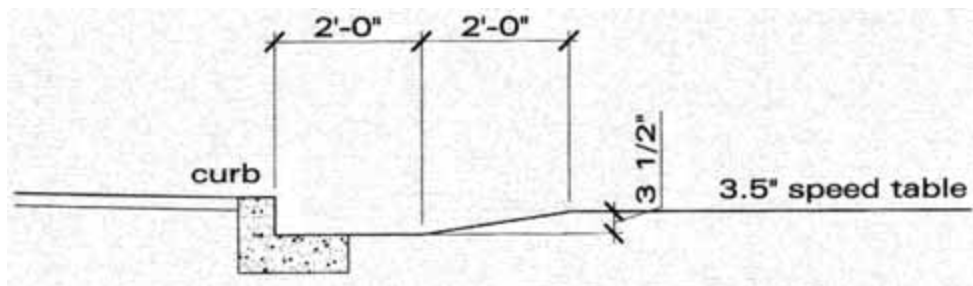


Traffic Calming -Speed Table

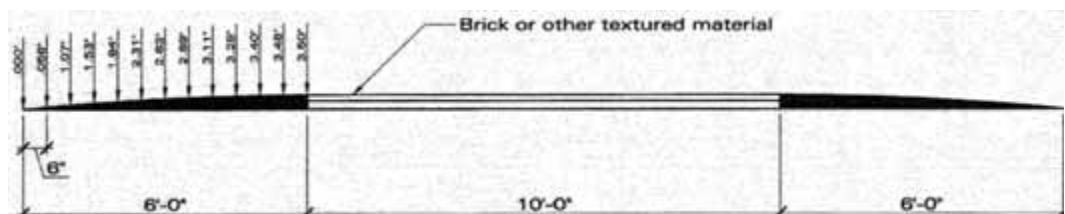


NOTE:

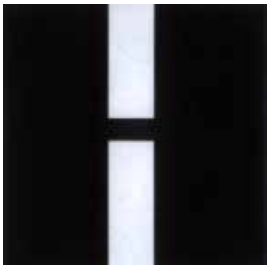
- Drainage requirements must be evaluated and addressed.

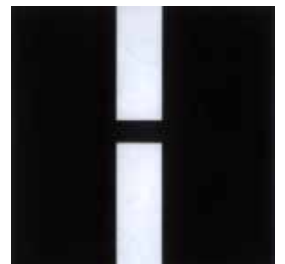
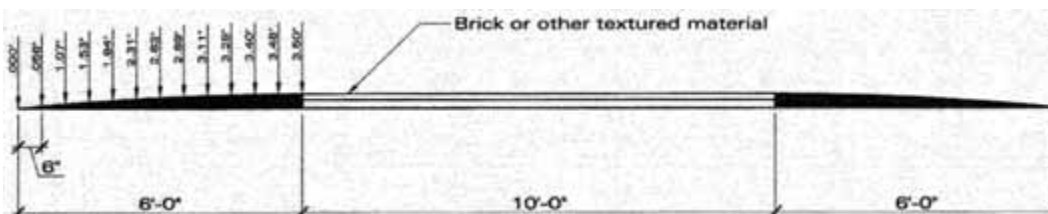
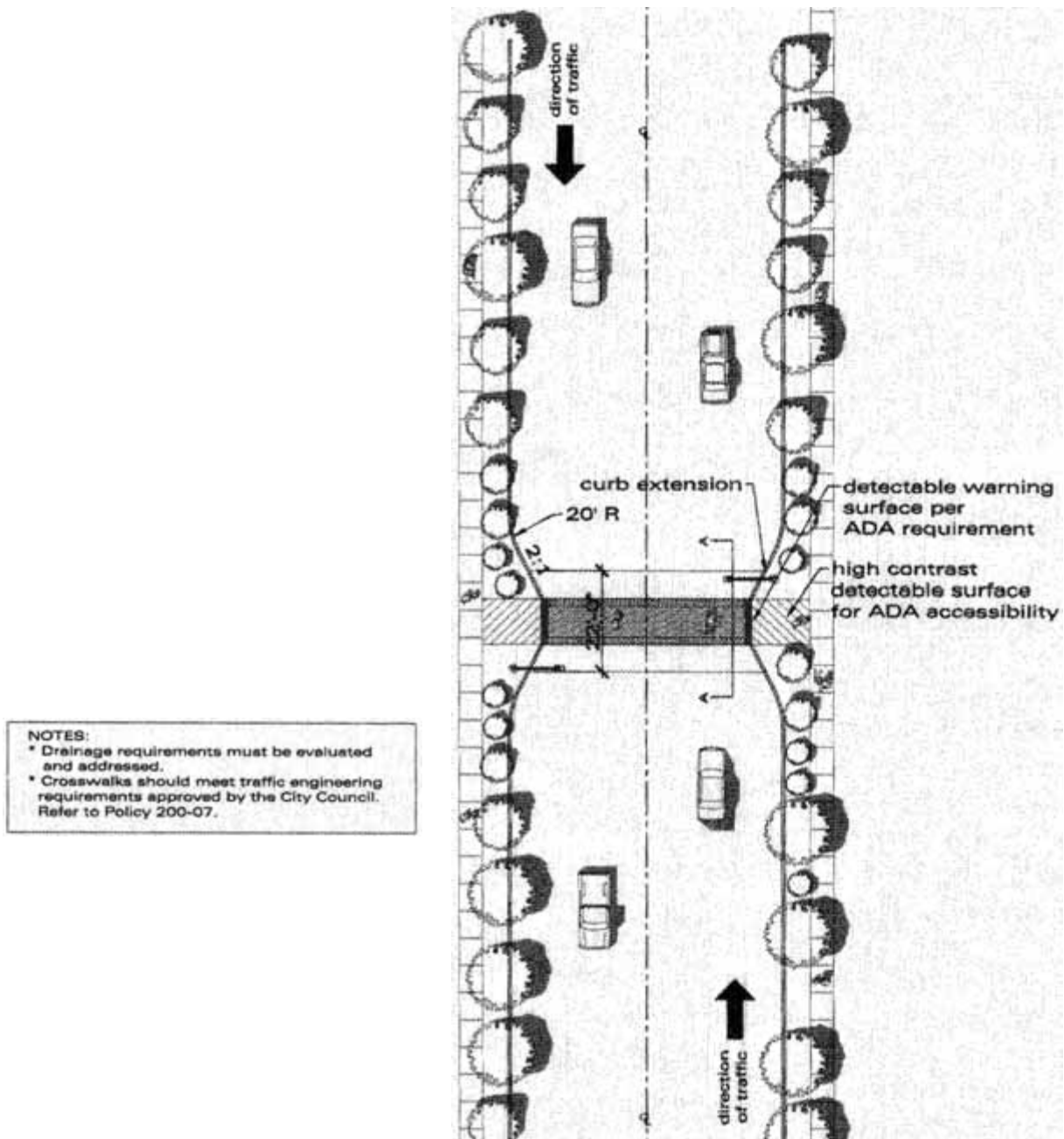


Section B-B



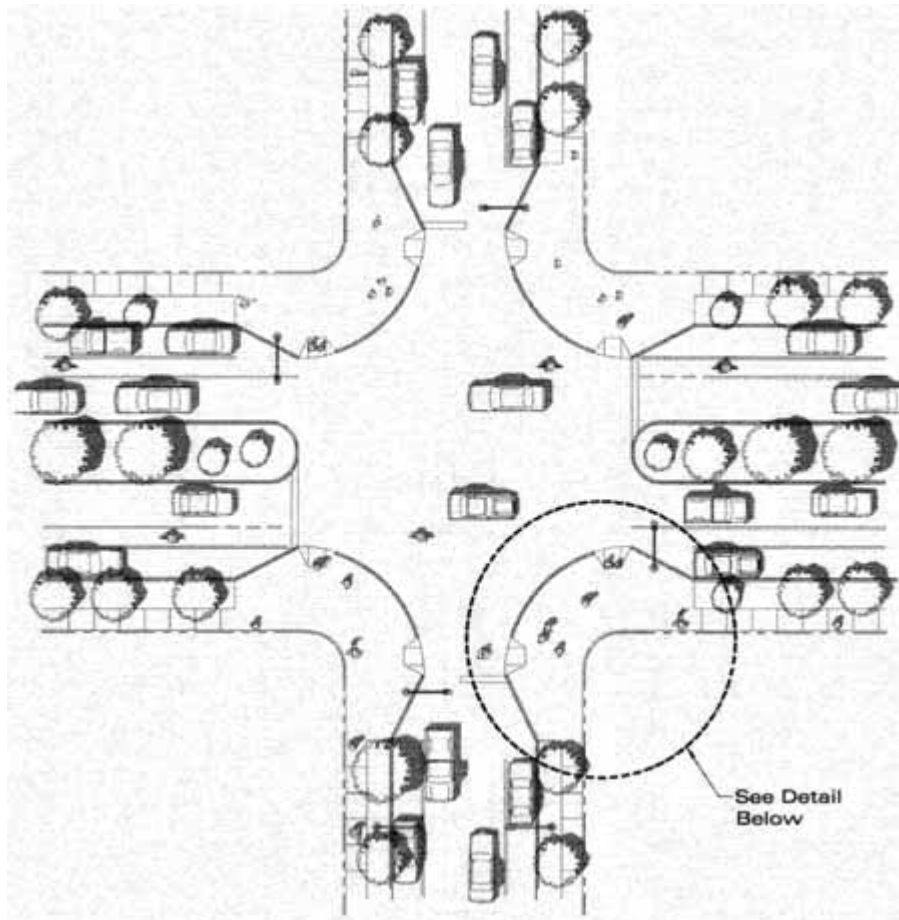
Section A-A







Traffic Calming *-Intersection Pop-out*



NOTE:

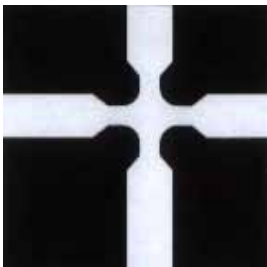
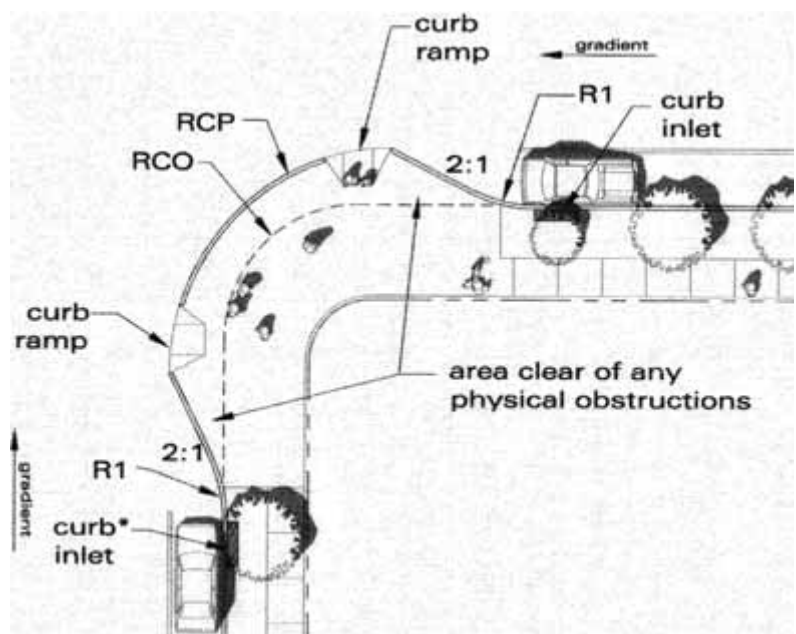
* Drainage requirements must be evaluated and addressed.

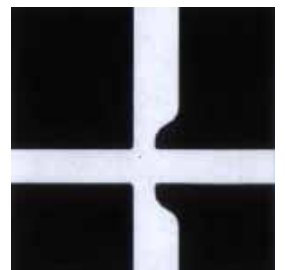
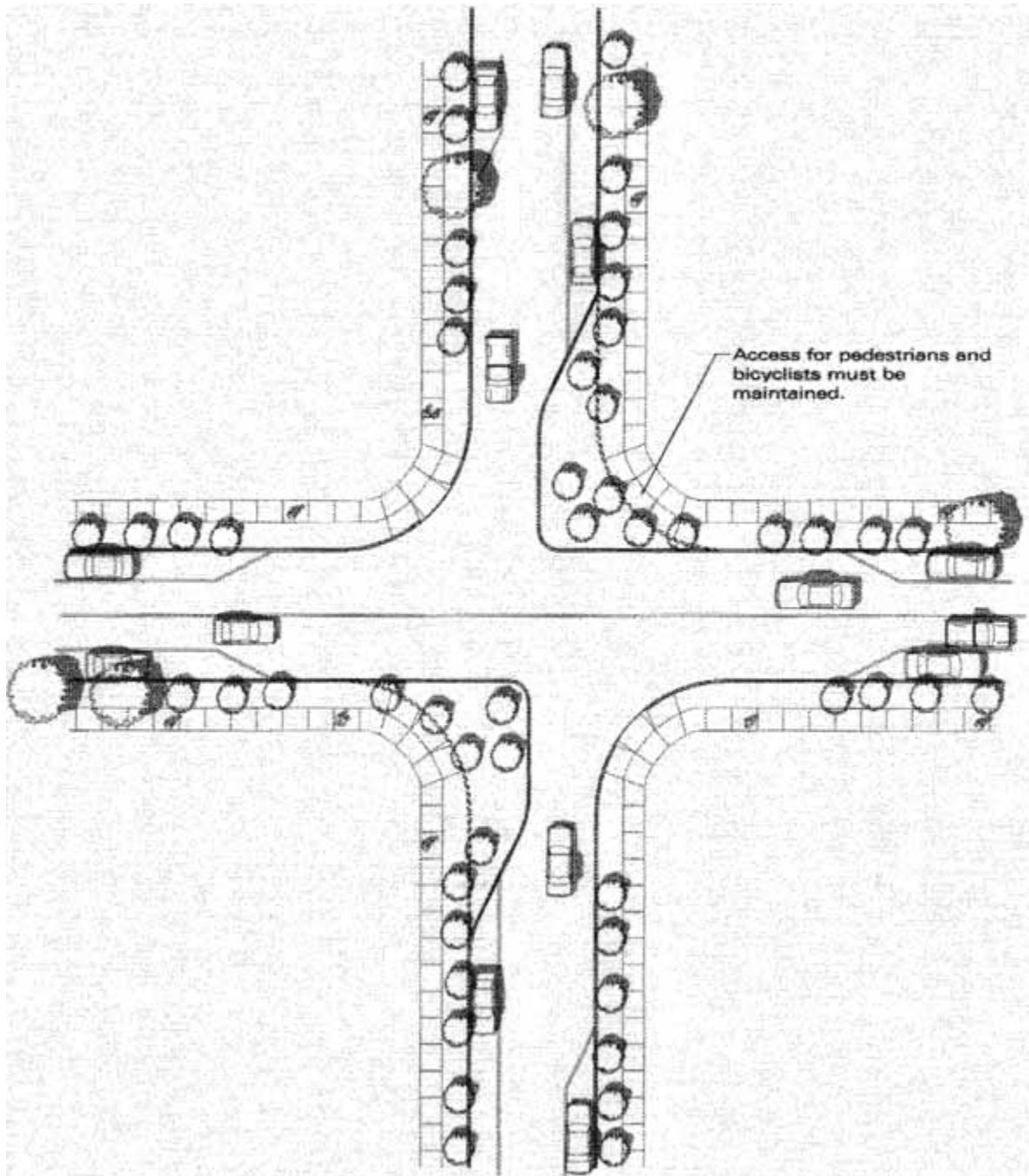
Legend

RCP - 30' (9.2 m) minimum

RCO - Retrofit installations- original curb radius

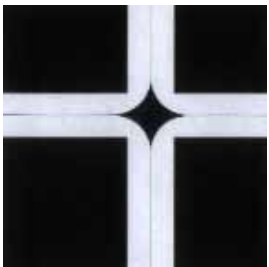
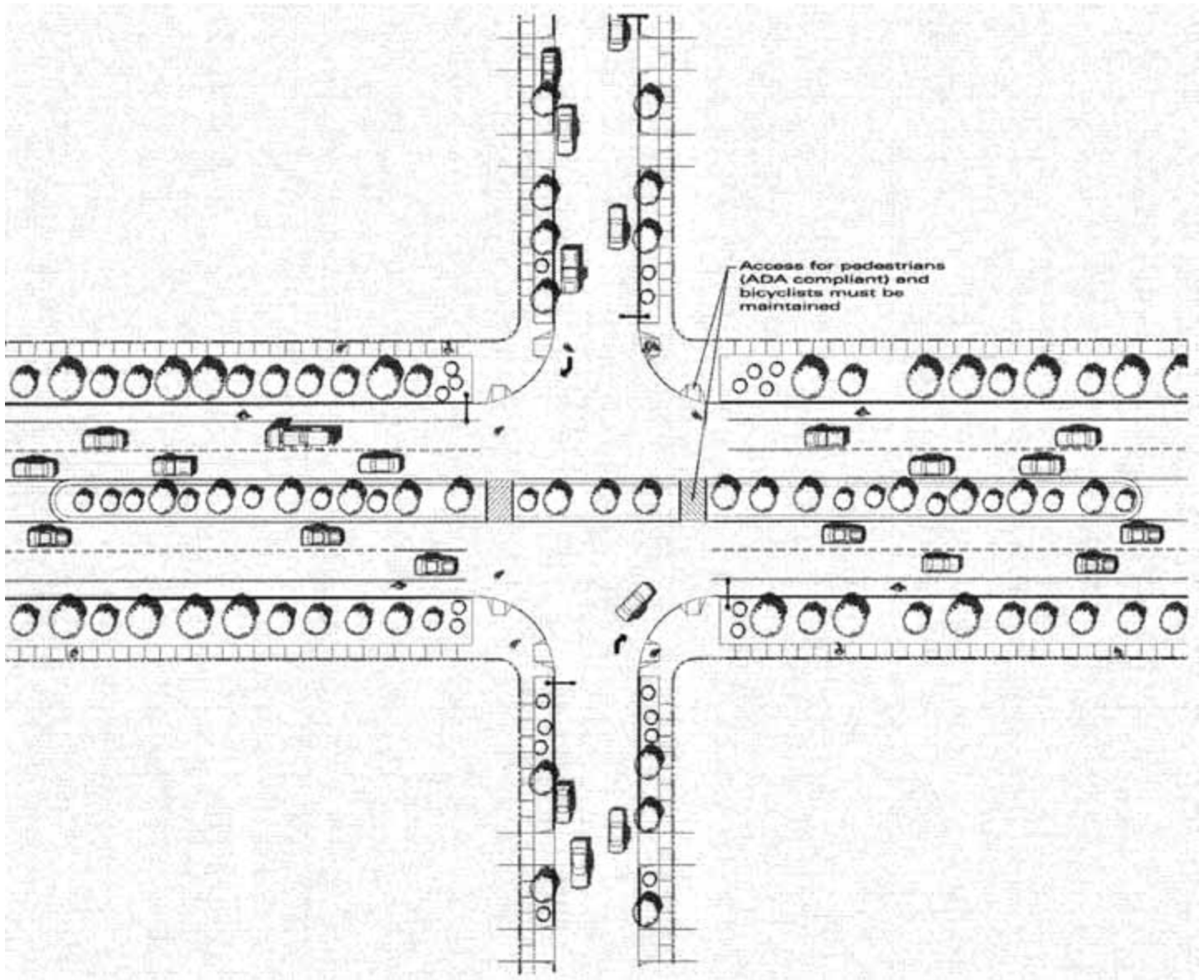
R1 - Curb radius 20' (6 m)







Traffic Calming -Channelization



Street Lighting

–Street Lights shall be provided in accordance with the approved Council Policy 200-18, Street Lighting.



J. Street Lights

1. Street lighting shall be installed at all street intersections and shall conform to Table L-1. All street lighting shall be high-pressure sodium vapor (HPS) except for areas which are designated for low pressure sodium vapor (LPS). Contact the Development Services Department for current information.

2. Midblock street lighting shall be installed as follows:

- a. On residential and collector streets, staggered at intervals not to exceed 150 feet (45m) within 1,320 feet (400 m) of transit stops and in residential and commercial high-crime census tracts, or in other areas staggered at intervals not to exceed 300 feet (90 m).
- b. On Four-Lane Urban Major Streets or higher with center medians, on both sides of the street at intervals not to exceed 150 feet (45 m) within 1,3020 feet (400 m) of transit stops and in residential and commercial high-crime census tracts, or in other areas on both sides of the street at intervals not to exceed 300 feet (90m).
- c. Near the end of cul-de sacs that exceed 150 feet (45m) within 1,320 feet (400 m) of transit stops and in residential and commercial high-crime census tracts, or in other areas near the end of cul-de-sacs that exceed 200 feet (60 m) in length.
- d. One light on each side of the street at at-grade railroad crossings to illuminate the side of the train facing the motorist.
- e. In areas of high pedestrian activity, such as schools, parks, transit centers, access to transit, and commercial and recreational facilities that draw large numbers of pedestrians.

f. At other locations, such as at abrupt changes in horizontal or vertical alignment, or areas of heavy pedestrian use, as needed.

3. Agriculture-zoned or natural open space land may be exempted from midblock street lighting provisions, at the directions of the City Engineer.

4. Midblock street lighting shall be full cutoff, Type III fixtures and shall conform to the following:

- a. 100 Watt HPS or 55 Watt LPS, as applicable, in alleys.
- b. 150 Watt HPS, or 90 Watt LPS, as applicable, for local residential streets (any width) and streets classified as collector or higher with curb-to-curb width up to and including 40 feet (12.2 m).
- c. 250 Watt HPS or 135 Watt LPS, as applicable, for streets classified as collector or higher with curb-to-curb width greater than 40 feet (12.2m) up to and including 52 feet (16.0m).
- d. 250 Watt HPS or 180 Watt LPS, as applicable, for streets classified as collector or higher with curb-to-curb width greater than 52 feet (16.0 m).

5. Supplemental street lighting, for: a) ornamental, b) continuous street lighting, or c) pedestrian-scale lighting purposes, shall be installed in street lighting assessment districts. Street lighting assessment districts will be formed only upon the request of the properties which will be included in the district.

- a. Ornamental street lighting shall be designed to meet the desires of the street lighting assessment district. Custom poles, luminaries, and spacing may be used.
- b. Continuous street lighting shall conform to RP-8, "American National Standard Practice for Roadway Lighting," or the Illuminating Engineering Society of North America.

Table L-1
Street Lighting at Non-Signalized Intersections*

Street A Street B	B1 Local residential streets (any width) and collector or higher streets up to and including 40 ft. wide, curb-to-curb	B2 Collector or higher streets greater than 40 ft. and up to and including 52 ft. wide, curb-to-curb	B3 Collector or higher streets greater than 52 ft. wide, curb-to-curb
A1 Local residential streets (any width) and collector or higher streets up to and including 40 ft. wide, curb-to-curb	(A1-B1) Install one 90 W. LPS or 150 W. HPS light, as applicable, on the far right corner of the higher volume street.	(Same as A2-B1)	(Same as A3-B1)
A2 Collector or higher streets greater than 40 ft. and up to and including 52 ft. wide, curb-to-curb	(A2-B1) Install one 250 W. HPS or 135 W. LPS light, as applicable, on each of the far right corners of the wider street.	(A2-B2) Install one 250 W. HPS or 135 W. LPS light, as applicable, on each of the far right corners of the higher volume street.	(Same as A3-B2)
A3 Collector or higher streets greater than 52 ft. wide, curb-to-curb	(A3-B1) Install one 250 W. HPS or 180 W. LPS light, as applicable, on each of the far right corners of the wider street, and 150 W. HPS or 90 W. LPS light, as applicable, on each of the far right corners of the narrower street.	(A3-B2) Install one 250 W. HPS or 180 W. LPS light, as applicable, on each of the far right corners of the wider street, and one 250 W. HPS or 135 W. LPS light, as applicable, on each of the far right corners of the narrower street.	(A3-B3) Install one 250 W. HPS or 180 W. LPS light, as applicable, on each of the far right corners of the intersection.

* Energy and maintenance costs are provided by the City.

NOTES:

1. Street lighting fixtures shall be HPS or LPS full cutoff, Type III.
2. Street lighting standards and mounting heights shall conform to City of San Diego Standard Drawing SDE-101.
3. Street Lighting at signalized intersections shall conform to the Caltrans Traffic Manual.



Street Lighting *-Intersection Lighting*

C. Pedestrian Scale Lighting

Where pedestrian-scale lighting is installed, sidewalk or walkway lighting shall provide adequate lighting for pedestrians of all abilities and shall conform to the following:

1. In commercial areas, the average maintained horizontal illuminance (FC) on the sidewalk or walkway shall not be less than 0.9 foot-candles and shall not exceed illuminance uniformity ratio (UR) of 4:1 ($FC_{Avg}:FC_{Min}$).
2. In mixed-use areas, the average maintained horizontal illuminance on the sidewalk or walkway shall not be less than 0.6 foot-candles and shall not exceed UR of 4:1 ($FC_{Avg}:FC_{Min}$).
3. In residential areas, the average maintained horizontal illuminance on the sidewalk or walkway shall not be less than 0.4 foot-candles and shall not exceed UR of 6:1 ($FC_{Avg}:FC_{Min}$).
4. In commercial areas, contributions from other nearby storefront lighting, private lighting, sign lighting and/or reflections from structures on private property should not be considered as a reason for reducing the sidewalk or walkway illuminance levels indicated above.
5. Sidewalk or walkway lights shall have cutoff fixtures that keep light pollution, light trespass, and glare to drivers to a minimum, as approved by the City Engineer. Manufacturer models for sidewalk and walkway lighting shall be approved by the City Engineer.
6. Agriculture-zoned land or open space may be exempt, at the discretion of the City Engineer, from pedestrian scale lighting provisions.
7. Further design guidelines can be found in the RP-8 publication of the Illuminating Engineering Society of North America, "American National Standard Practice for Roadway Lighting."